

DRAWINGS

Please add the four drawing sheets attached to the end of this amendment to the application (Figs. 8-12).

REMARKS

These remarks are in response to the Office Action mailed November 12, 2003. The examiner has objected to the incorporation by reference of U.S. Application No. 09/345,672. Responsive to this rejection, applicants have copied substantially all of the material, including the drawings, from that application into the present application.

The invention as now claimed relates to the problem of illuminating sample surfaces for infrared reflectance imaging spectrometers. These spectrometers can be used to monitor chemical properties of surfaces in a variety of settings, such as in pharmaceutical, agricultural, and polymer industries. To obtain the best signal-to-noise ratio in these instruments, large, high-intensity illumination sources have usually been used. These sources tend to be expensive, draw large amounts of electrical power, and generate a lot of heat. And even the best of these sources do not provide enough light for optimum spectral measurements in many instances.

The invention as now claimed in amended claim 41 proposes a very different approach. The sample is illuminated with differently directed beams of infrared light from different positions, and a two-dimensional reflectance image of the sample surface illuminated by these beams is detected. A spectroscopic signal can then be derived from relative amounts of infrared light from the differently directed beams in different spectral regions. This signal includes two-dimensional spatial information about the chemical properties of the sample surface at different wavelengths.

This approach allows imaging infrared reflectance spectrometers to create higher-quality images. Specifically, illuminating a sample with differently directed beams of infrared light from different positions can prevent shadows from being created on the sample, and thus allows better spectral and spatial information about the sample to be reflected to a two-dimensional image detector. Illuminating a sample with differently directed beams of light can also allow all of the areas of even the most irregularly shaped sample to be uniformly illuminated with infrared light. The result is a two-dimensional image that does not exhibit darker and lighter areas, but instead shows a uniform picture of the chemical properties of a surface.

Claim 41 stands rejected over Kley et al. Kley et al disclose a technique for measuring a blood analyte by non-invasive spectrometry in living tissue. In this technique, electromagnetic energy from a light source is passed through the tissue being sampled (typically the ear lobe or finger) to one or more detectors (col. 4, lines 21-24, col. 8, lines 65-67). A combination of sources are said to be used to provide a broad spectral response (col. 6, lines 53-55).

But Kley et al. do not disclose the detection of a two-dimensional infrared reflectance image of a sample surface illuminated with differently directed beams of infrared light from different positions. They instead disclose a technique for measuring a blood analyte by passing light through tissue. Nowhere do Kley et al. disclose the concept of detecting a two-dimensional infrared reflectance image of a sample.

Kley et al. were concerned with an entirely different type of problem. Rather than trying to understand the distribution of chemical properties on a surface, they are trying to measure the concentration of a blood analyte located inside live human tissue. This is a very different problem, and it in no way teaches the desirability of providing for the detection of a two-dimensional infrared reflectance image of a sample surface illuminated with differently directed beams of infrared light from different positions. Absent hindsight, one of ordinary skill in the art therefore would not be motivated to modify the Kley et al. in such a way as to obtain the invention as now claimed in amended claim 41.

Claims 1 and 58 distinguish over the prior art of record for at least reasons similar to those advanced in support of claim 41.

Should further questions arise concerning this application, the Examiner is invited to call Applicants' representative at the number listed below. The Commissioner is hereby authorized to charge any additional fees that may be required, or credit any overpayment, to Deposit Account No. 50-0750.

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Respectfully submitted,

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